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James V. Costigan

March 9, 2009

1007-034

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Hidenobu Mikami

Examiner: Taiwo Oladapo

Art Unit: 1797

Serial No.: 10/587,550

Filing Date: August 31, 2006

Title: GREASE ROLLING BEARING, CONSTANT VELOCITY JOINT AND ROLLING PARTS

New York, NY 10036
March 9, 2009

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT

Sir:

This Amendment is being filed in response to the Office Action that was mailed December 9, 2009. Kindly amend the subject application as follows:

IN THE CLAIMS

1. (currently amended): A grease comprising a base grease and an additive, wherein the base grease comprises a base oil and a thickener, said base oil is ~~at least~~ one oil selected from among poly-α-olefin oil, mineral oil, ~~ester oil,~~ and ether oil, said base oil having a kinematic viscosity of 20 to 200mm^2/s at 40°C and the additive comprises inorganic bismuth compounds.

2. (previously presented): The grease according to claim 1, wherein 0.01 to 15 wt % of the inorganic bismuth compounds are ~~is~~ added to a total amount of said base grease and said additive.

3. (canceled)

4. (original): The grease according to claim 1, wherein said inorganic bismuth compounds are at least one inorganic bismuth selected from among bismuth sulfate, bismuth trioxide, bismuth carbonate, and sodium bismuthate.

5. (canceled)

6. (canceled)

7. (original): The grease according to claim 1, wherein said thickener is at least one compound selected from among urea-based compounds and lithium soap.

8. (withdrawn): A rolling bearing comprising an inner ring; an outer ring; a plurality of rolling elements interposed between said inner ring and said outer ring, wherein a grease is applied to a periphery of said rolling elements; and said grease is as defined in claim 1.

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9. (withdrawn): The rolling bearing according to claim 8, wherein said rolling bearing is a roller bearing.

10. (withdrawn): The rolling bearing according to claim 8, wherein said rolling bearing has a thrust sliding surface.

11. (withdrawn): The rolling bearing according to claim 8, wherein said rolling bearing is used for a wheel.

12. (withdrawn): The rolling bearing according to claim 11, wherein said rolling bearing for use in a wheel is a rolling bearing, for use in a rolling stock, having a flange and is used as a rolling bearing for an axle of said rolling stock or as a rolling bearing for use in a main motor.

13. (withdrawn): The rolling bearing according to claim 11, wherein said rolling bearing for use in a wheel is a rolling bearing, for use in a wheel-supporting apparatus, having a thrust sliding surface and is used for said wheel-supporting apparatus rotatably supporting a rotary member that is rotated together with said wheel by means of a grease-enclosed rolling bearing mounted on an outside-diameter surface of an axle.

14. (withdrawn): The rolling bearing according to claim 11, wherein said rolling bearing for use in a wheel is a rolling bearing, for use in a rolling neck of a rolling machine, having a thrust sliding surface; an inner ring has one double row inner ring; an outer ring has one double row outer ring and two single row outer rings disposed at both ends of said double row outer ring through a spacer; rolling elements are circumferentially rotatably disposed in four rows between said inner ring and said outer ring; and an annular seal member is mounted at both ends of said outer ring.

15. (withdrawn): The rolling bearing according to claim 8, wherein said rolling bearing comprises a metal inner ring

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having a rolling surface on a peripheral surface thereof; a metal outer ring, having a rolling surface on an inner peripheral surface thereof, which is disposed concentrically with said metal inner ring; and a plurality of metal rolling elements disposed between said both rolling surfaces, wherein a coating film of at least one substance selected from among bismuth and inorganic bismuth compounds is formed on at least one contact surface selected from among said both rolling surfaces and surfaces of said rolling elements.

16. (withdrawn): The rolling bearing according to claim 15, wherein said inorganic bismuth compounds are bismuth oxides.

17. (withdrawn): The rolling bearing according to claim 8 for use in a wheel-supporting rolling bearing unit, wherein said wheel-supporting rolling bearing unit comprises a stationary side bearing ring fixedly supported by a suspending apparatus when said rolling bearing unit is operated; a rotary side bearing ring fixedly supporting a wheel when said rolling bearing unit is operated; and a plurality of rolling elements provided between a stationary side rolling surface present on a surface of said stationary side bearing ring and a rotary side rolling surface present on a surface, of said rotary side bearing ring, confronting said surface of said stationary side bearing ring, wherein a rolling contact portion between each of said rolling elements and said stationary side rolling surface as well as said rotary side rolling surface are lubricated by grease.

18. (withdrawn): A constant velocity joint in which a rotational torque is transmitted by engagement between a track groove and a rolling element, and by rolling of said rolling element along said track groove, an axial movement is performed, and a grease enclosed in said constant velocity joint is said grease according to claim 1.

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19. (withdrawn): The constant velocity joint according to claim 18, wherein said base oil of said grease has a kinematic viscosity of 30 to 500 mm^2/s at 40°C.

20. (withdrawn): A rolling part having a coating film of one substance selected from among bismuth and inorganic bismuth compounds formed on a surface thereof and being used in contact with said grease according to claim 1.

21. (withdrawn): The rolling part according to claim 20, wherein said inorganic bismuth compounds are bismuth oxides.

22. (withdrawn): The rolling bearing according to claim 8, wherein said rolling bearing, wherein a main shaft on which a blade is mounted is used for a main shaft-supporting apparatus for wind power generation supported by at least one rolling bearing mounted on a bearing housing.

23. (previously presented): The grease according to claim 1 wherein said base oil is a poly-α-olefin oil having a kinematic viscosity of 20 to 200mm^2/s at 40°C.

24. (previously presented): The grease according to claim 1 wherein said base oil is a mineral oil having a kinematic viscosity of 20 to 200mm^2/s at 40°C.

25. (canceled)

26. (previously [presented): The grease according to claim 1 wherein said base oil is an ether oil having a kinematic viscosity of 20 to 200mm^2/s at 40°C.

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REMARKS

In paragraph 2 of the Office Action, claims 1-7 were rejected under 35 U.S.C.§102(a) or (e) as being anticipated by Willey et al.(Willey).

Reconsideration is requested.

Claim 1 has been amended to delete the words "at least" and "ester oil". This does not raise a new issue as claims 23, 24 and 26 were all directed to a single base oil formulation. The term "mm^2/" has been corrected to read --mm^2/s-- in accordance with page 27, line 20 of the specification.

The present invention is directed to a grease composition comprising a base grease and an additive. The base grease comprises a base oil and a thickener where the base oil is one oil that is either a poly-α-olefin oil , a mineral oil or an ether oil. The kinematic viscosity of the oil is between 20 and 200mm^2/s at 40°C and the additive comprises an inorganic bismuth compound. When the grease is enclosed in a bearing, a constant velocity joint or a rolling part, an inorganic bismuth compound is supplied to a sliding surface where it forms a film coating. The inorganic bismuth compounds are capable of allowing the surface of the moving part which is under extreme pressure to resist those extreme pressures property for an extended period of time. This prevents frictional wear and flaking on the lubricated surface.

Willey discloses a grease intended for rock bit lubrication where the grease is based on a high viscosity poly-α-olefin synthetic base fluid that is used in combination with an additional base fluid, a metal complex soap thickener and a bismuth oxide extreme pressure additive (hereafter a HVI PAO grease).

This rock bit lubricantexhits an ability to operate at temperatures of 300°F or higher fro at least 300 hours and is compatible with elastomers, and resist thermal and oxidative

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degradation. while providing high load carrying capability. This is explained at paragraph [0006] of Willey. The Willey disclosure stresses the need for a combination of base oils, with one high viscosity oil and one low viscosity oil(Willey paragraph [0007]). The base oil of the Willey HVI PAO grease is made by blending a high viscosity component with a low viscosity component, such as alkylated naphthalene as describe by Willey in paragraph [0062]and in the Examples. For these reason, the use of a single component oil in grease as pointed out in amended claim 1 is novel as compared to the Willey formulation. Willey also discloses an ester oil based grease which has been excluded from amended claim 1 by this Amendment. For these reasons, it is requested that this ground of rejection be withdrawn.

An early and favorable action is earnestly solicited.

Respectfully submitted,

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